COMPLILATION OF RESOURCE MATERIALS FOR MEDIA PERSONNEL

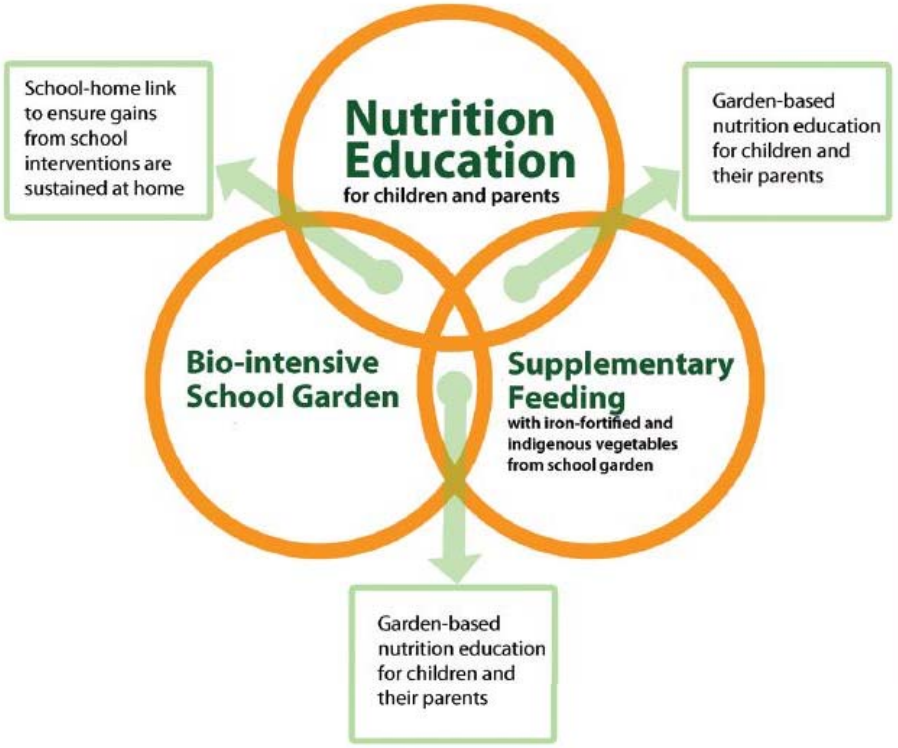
Oro, Emilita;Agdeppa, Imelda;Baguilat, Irish;

Gonsalves, Julian;Capanzana, Mario;Itliong, Kirstein;Anunciado, Ma. Shiela;Sarmiento, Ian Kurt;Lainez, Carmina;

IDRC Grant/ Subvention du CRDI: 108156-001-Improving food and nutrition security in the Philippines through school interventions

Annex 8. Compilation of resource materials prepared for media personnel

Integrated School Nutrition Model



A 3-year action research project funded by the International Development Research Center (IDRC) in 2012-2015 has developed and tested an integrated school nutrition model in the Philippines. Research was collaboratively undertaken in Region 4A by the International Institute of Rural Reconstruction (IIRR), the Food and Nutrition Research Institute-Department of Science and Technology (FNRI- DOST), and the Department of Education (DepEd).

The innovation integrated 3 major components:

Bio-intensive School Gardens

These were enhanced using ecological gardening practices to improve productivity and sustainability. Practices include deep-dug, raised plots followed by minimum tillage, use of green tree fertilizers like kakawate (*Gliricidia sepium*), and cover cropping using legumes during summer-season to protect soil health. Decentralized crop museums helped conserve and propagate seeds of local vegetables to support needs of schools and household gardens.

Supplementary Feeding

Iron-fortified rice and indigenous vegetables from school gardens were used for feeding of underweight children. Fifteen menus with indigenous vegetables were developed, lab-tested, and used.

Nutrition Education

It was provided to students, parents/ care providers/ guardians, and teachers to promote the importance of nutrient-dense food and good eating habits. It ensures sustainability of gains in school nutrition program while optimizing benefits from limited resources. Nutrition-sensitive lesson plans and modules were developed and used by teachers for children and parents.

Integrating nutrition-related interventions resulted to:

- Enhanced garden productivity and functionality
- Improved year-round availability of diverse vegetables with lesser inputs, easier maintenance of gardens, and overall improvement in yield and crop performance
- Conservation and mass production of indigenous vegetables through the establishment of 27 school crop museums
- Improved nutritional state of schoolchildren through the use of standardized recipes using indigenous vegetables and iron-fortified rice in feeding program
- Improved knowledge and attitude towards nutrition and gardening through education

Serving vegetables produced in the school garden resulted in better nutrition while lowering feeding costs. Results from a study with 160 children showed improvements on nutrition knowledge, attitude and practices among children and parents.

Experience with the pilot implementation of the program underscored the important role of institutional mechanisms, partnership building, communication support and capacity-building strategies. Development/refinement and enforcement of implementation guidelines are warranted even before the potential of gardens to support school feeding program.

Visit **https://schoolnutritionphils.wordpress.com** for more information about the integrated school nutrition model during its pilot testing. Efforts to scale up the adoption of the model in every public elementary school are underway, in partnership with relevant agencies, particularly the DepEd. It is envisioned that this will bring good nutrition to many kids, more quickly!

IDRC CRDI

IIRR
INTERNATIONAL INSTITUTE OF RURAL RECONSTRUCTION

Km. 39 Aguinaldo Highway
IIRR Y.C. James Yen Center, Biga 2
Silang, Cavite 4118, Philippines
Tel/Fax: +63 46 430 0016
philippines@iirr.org

Learning and sharing event
February 28, 2017; 9:00 AM; Tinabunan Elementary School Imus City
Activity design

Background

Schools and day care centers provide strategic, targeted pathways for delivering nutrition interventions among children and, indirectly, to their families and communities. While recently, there's been heightened awareness of child nutrition issues in the Philippines, examples of widespread successes in the integration of gardening, feeding, and nutrition education have not yet been demonstrated at the regional (sub-national) level. Moreover, large-scale action is limited because the types of local financing mechanisms and institutional frameworks have not yet been determined. Regular and continuing school feeding programs cannot be financially sustained by individual schools alone; without targeted financing from local governments and/or with private sector contributions. A deeper understanding of structural, functional, and policy factors that affect the *scaling* of holistic, integrated school nutrition model is crucial.

In spite of a favorable policy framework, schools have continued to face challenges in implementing effectively and in sustaining nutrition initiatives. In one study conducted by Adela Jamorabo-Ruiz, et. al.[1]it was found that the implementation of the components of School Health and Nutrition program in the Philippines did not achieve its highest level of implementation in public elementary school due to lack of resources, staff, and support from higher authorities, including school administrators (at school level) and the host local community, and lack of training knowledge. Structural problems, a limited understanding of the value of integrated approaches and feeding implementation challenges, especially the lack of local financing, can affect implementation and sustainability.

In 2015, a 3-year action research project jointly implemented by the International Institute of Rural Reconstruction (IIRR), the Food and Nutrition Research Institute of the Dept of Science and Technology and Dept of Education developed and tested an integrated nutrition model of gardening, supplementary feeding and nutrition education, among schoolchildren in Cavite province in the Philippines. Results showed that supplementary feeding of malnourished school children using iron-fortified rice and indigenous vegetables from school gardens significantly improved their nutritional status. Enhanced knowledge, attitude and practices on gardening and nutrition were observed among parents. The project tested and successfully sustained bio-intensive nutrition gardens and crop museums that aimed to retrieve and conserve crop cultivars while improving year-round availability of a diverse range of climate-resilient, locally adapted, and nutritionally important vegetables.

To date, the research project generated lessons and numerous learning products such as posters, standardized recipe and nutrition education modules which can be utilized by schools, day care centers and communities.

Objectives

This event aims to:

1. To share tested interventions to relevant government and non government institutions.
2. To provide space for different stakeholders to share their existing programs.
3. To identify practices that can be adopted/adapted to enhance their existing programs.

[1](WorldConference.net Proceeding of Global Summit on Education, Kuala Lumpur, 2013)

Date and time: February 28, 2017; 9:00 AM
Venue: Tinabunan Elementary School, Imus city, Cavite

Participants: Key decision makers and program planners from:
Dept of Social Welfare and Development
National Nutrition Council
Dept of Agriculture
Non government organizations

Program

9:00 AM	**Arrival of guests**
9:00 – 9:45 AM	Visit to garden, feeding center and exhibits
9:45-11:30 AM	Opening prayer National anthem Opening remarks Garden visit Opening of exhibit Presentation 1: Integrated school nutrition model / Rationale Presentation 2: Alliance building (Partnership) Sharing from other agencies - DSWD Open forum
11:30 AM	Early lunch

"Improving Food and Nutrition Security in the Philippines through school interventions"

PRESS RELEASE
February 28, 2017

School gardening, nutrition education and supplementary feeding (GarNESup) can help solve malnutrition among school children

Bio-intensive school gardening, nutrition education, and supplementary feeding will help solve malnutirion among schoolchildren in the Philippines according to the International Institute of Rural Reconstruction (IIRR), a development organization based in Silang, Cavite. In 2012, IIRR, together with the Food and Nutrition Research Institute- Department of Science and Technology (FNRI-DOST), and the Department of Education (DepEd) Region IV-A with funding support from the International Development Research Centre (IDRC) of Canada developed and tested an integrated school nutrition model to improve the food and nutrition security among schoolchildren in selected public elementary schools in Cavite.

IIRR explained that the 3-year action research showed that integrating nutrition-related interventions in schools like gardening, nutrition education, and supplementary feeding or GarNESup will help address the growing incidence of hunger and malnutirion in the country. "Results showed that it enhanced bio-intensive nutrition gardens productivity and functionality and crop museums that aimed to retrieve and conserve crop cultivars while improving the year-round availability of a diverse range of climate-resilient, locally adapted, and nutritionally important vegetables. Supplementary feeding of malnourished school children using iron-fortified rice and indigenous vegetables from school gardens significantly improved their nutritional status. Enhanced knowledge, attitude and practices on gardening and nutrition were observed among children and parents through education," explained Irish Baguilat, IIRR's Philippine Program Food Security and Nutrition Manager.

IIRR pointed out that bio-intensive school gardens were enhanced using ecological gardening practices to improve productivity and sustainability. Practices include deep-dug, raised plots followed by minimum tillage, use of green tree fertilizers like kakawate *(Giiricidia sepium)*, and cover cropping using legumes during summer season to protect soil health. "Decentralized school crop museums helped conserve and propagate seeds of local vegetables to support needs of schools and household gardens," added Baguilat.

IIRR stressed that supplementary feeding improved access to highly nutritious food and nutritional status of school children and reduced anemia rates among selected schoolchildren. "Iron-fortified rice and indigenous vegetables from school gardens were used for the feeding of underweight children. Fifteen menus with indigenous vegetables were developed, lab-tested, and used. Serving vegetables produced in the school garden resulted in better nutrition while lowering feeding costs," added Baguilat. IIRR also underscored the importance of nutrition education among teachers, school children and parents in school and extending it at home to sustain the gains from school interventions. "Results from a study with 160 children showed improvements in nutrition knowledge, attitude, and practices among children and parents through the development of nutrition-sensitive lesson plans and modules, promotion on the importance of nutrient-dense food and good eating habits and garden-based nutrition education."

IIRR called for wider adoption of the GarNESup model by other agencies implementing food and nutrition security programs like the Department of Social Welfare and Development (DSWD) and the Department of Agriculture, non-government organizations and local government units for quicker scaling up.

The Learning Event Learning and Sharing Event on School Nutrition held last **February 28, 2017** at **Tinabunan Elementary School in Imus City** showcased the integrated school nutrition program model through lectures, garden visit and taste-test of recipes using indigenous vegetables from school garden. ###

For inquiries, please contact:
Ms. Kirstein D. Itliong
Mobile: +63 916 664 9163
Landline: (046) 430 0016
Email:kirstein.itliong@iirr.org

"Improving Food and Nutrition Security in the Philippines through school interventions"

Project Brief

The 2013 national nutrition survey revealed that underweight prevalence among 5-10.0 years of age is higher (29.1%) than in other age group. For stunting (low height-for-age), although there's an improvement since the last survey in 2011, it is still at 29.9%; and wasting (low weight-for-height) is at 8.6%, about the same in 2011 at 8.5%. Clearly, this is a reason for concern and fortunately this situation has in recent years been brought to the attention of the country's planners, policy makers and legislators.

The integrated school nutrition model that links 3 interventions was developed to maximize the potential of schools as platform to address food and nutrition challenges. (i) **Supplementary feeding** used iron-fortified rice and indigenous vegetables from school gardens. Recipes with indigenous vegetables were developed and used. (ii) **School gardens** were enhanced with agro-ecological technologies such as bio-intensive gardening to improve productivity and sustainability of gardens. Various (iii) **Nutrition education** methodologies were conducted for children and caregivers. The model was developed through an action research project implemented in 2012 to 2015 in a single province with support from the International Development Research Centre. The model builds on existing nutrition interventions of the Department of Education (DepEd) with emphasis on sustainability and synergy of programs. The follow through 28-month action research project aims to



fine tune the model, to test a multi-scalar approach to scale up the model in Philippines school system, and to use schools as platform for nutrition and environmental learning and sharing. The partnership of International Institute of Rural Reconstruction (IIRR), DepEd and Food and Nutrition Research Institute - Department of Science and Technology (FNRI-DOST) resulted to achievement of significant milestones in the past 24 months.

Implementation guidelines were put together to support operationalization of the model and ensure strongly integrated components. Three sentinel research schools in Cavite province were selected for the purposes of rigorous data collection and further adaptation of the model. In the 3 sentinel research schools, the 120-day school feeding program resulted to a significant increase in the mean weight of students from baseline to end line. The extended feeding program or additional 80 days that was implemented in 3 sentinel research schools resulted to further significant increase in the mean weight and height of the students in both age groups and gender. Mechanisms to ensure links of the 3 components were documented and will be used to enhance the guideline.

The scaling up relies largely on 58 lighthouse schools (LS) established in Region IVA. The region is composed of 5 provinces subdivided by DepEd into 20 school divisions catering to 2,732 public elementary schools. LS are learning sites for other schools and action-research sites for evidence-building. Data showed that LS are implementing the integrated model at different levels. Garden diversity has been achieved in most schools and the link between gardens to feeding and learning were evident. LS were able to train other schools within their respective districts/divisions. At the same time, these 58 LS are also school crop museums (CM). School crop museums are decentralized conservation sites and nurseries of hardy and nutritionally dense indigenous or local vegetables. Additional 237 crop museums in Region IVA were set up to complement the scaling out efforts. Various strategies and strategic events were carried out such as multi-stakeholder events, partnership with 2 other agencies, sharing of research in conferences and conventions to increase adoption and publicize the model. It is envisioned that the outcomes achieved in Region IVA through program integration will be scaled up to more regions in the coming months.

Improving Food and Nutrition Security in the Philippines through School Interventions

School Nutrition Brief

Improving Food and Nutrition Security in the Philippines through School Interventions

Background

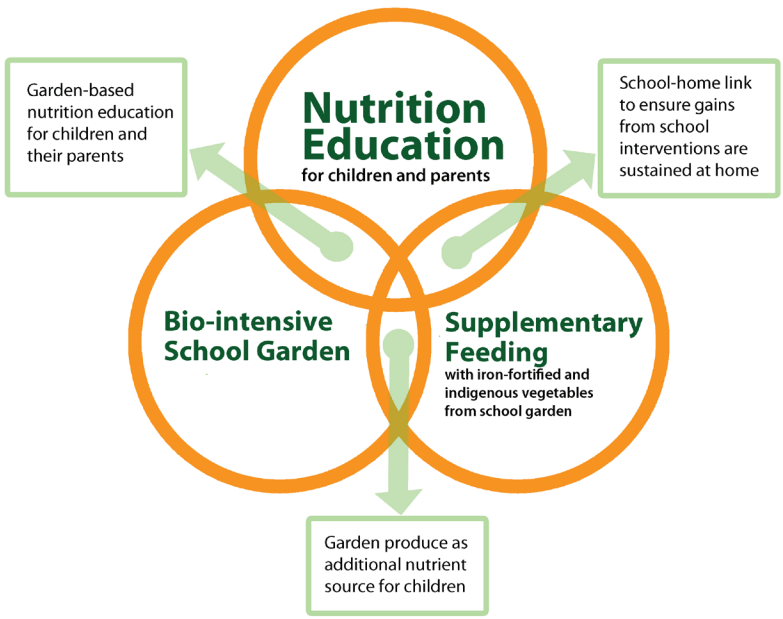
Introduction

Schools provide strategic and targeted pathways for delivering nutrition interventions to children and, indirectly, to their families and communities. A 3-year action research project (Phase 1) funded by International Development Research Centre (IDRC) from 2012 to 2015 developed and tested an integrated nutrition model of gardening, supplementary feeding and nutrition education, for schoolchildren in Cavite province in the Philippines. Results showed that supplementary feeding of malnourished schoolchildren using iron-fortified rice and indigenous vegetables from school gardens significantly improved their nutritional status. Enhanced knowledge, attitude and practices on gardening and nutrition were recorded among parents. The project tested and successfully sustained bio-intensive nutrition gardens and crop museums that aimed to retrieve and conserve crop cultivars while improving year-round availability of a diverse range of climate-resilient, locally adapted, and nutritionally important vegetables.

Phase 2 of this project (2015-2018) deepens the understanding and operationalization of the integrated model by expanding the number of research schools. The potential of schools as platforms for nutritional and environmental learning are also being investigated. Modalities by which local governments and private sectors can support school nutrition are also being explored.

This multi-scalar approach tests two pathways for scaling up. The first is directed towards public elementary schools at a subnational level. The second is directed at national agencies, policymakers and planners. Phase 2 intends to influence school health and nutrition programming, which currently is targeted towards 2 million malnourished schoolchildren (14% of total number of elementary students).[1]

The Innovation: The Integrated School Nutrition Model



[1] Department of Education, School Health and Nutrition Unit, 2012–2013 data.

(i) **School gardens were enhanced using the bio-intensive gardening technology (BIG), an ecological gardening approach that addresses productivity and sustainability challenges of gardens.** Bio-intensive gardening (BIG) approach has evolved as being not only nutrition-smart but also climate-smart. The approach was introduced into the school system as a response to sustainability and functionality issues. The approach was translated into BIG standards for schools which outline practices and principles. The garden standard emphasizes concepts of climate and nutrient smart gardens, nutrition-sensitive agriculture and its link to feeding and learning. A simple crop planning tool that takes into consideration feeding center requirements was developed and introduced to schools.

(ii) **Supplementary feeding of underweight children used iron-fortified rice and indigenous vegetables from school gardens.** For supplementary feeding, DepEd's implementation guideline was enhanced by integrating concepts and principles learned in the phase 1. The promotion of iron-fortified rice and the 15 recipes with indigenous vegetables were supplemented by developed iron-rich recipes for areas or cases where iron fortified rice is not available due to some reasons (no delivery because of floods, typhoons, etc). A 200-days feeding was implemented in 3 schools to demonstrate the value of year round school feeding, to examine and address implementation issues and to study more carefully how gardens can contribute to dietary diversification in the feeding program.

Important evidence about the value of integrating nutrition-related interventions has been generated. Anthropometric measurements, biochemical tests, and dietary intake studies with 80 underweight or anemic elementary schoolchildren demonstrated that the integrated approach reduced wasting from 17.8% to 13.7%, stunting from 11.0% to 4.1%, and underweight from 63.0% to 34.2%. In the school where iron-fortified rice was used, hemoglobin levels rose from 12.60±.96 to 13.09±.07 and anemia reduced from 20.8% to 4.2%. Serving vegetables produced in the school garden resulted in better nutrition while lowering feeding costs. Results from a study with 160 children showed improvements on nutrition knowledge, attitude and practices among children and parents.

(iii) **Nutrition education was provided for students, parents / care providers / guardians and teachers to promote the importance of nutrient dense food and good eating habits.** Nutrition Education (NE) for children includes use of nutrition sensitive lesson plans, use of garden as learning laboratory, use of nutri school-home connection approach and brief activities before feeding. Meanwhile, nutrition education for community or parents includes nutrition education sessions during PTA meetings, participatory activities such as cooking demonstration or recipe development during the nutrition awareness month and use of information, education and communication (IEC) materials. Different forms of IEC were developed to promote key nutrition and gardening messages. Teachers were provided with simplified reference materials (nutrition modules) and teaching aid to help them better incorporate nutrition topics into their daily lesson plans and to hold short sessions with parents during their regular parent-teacher meetings.

Significance of Research

In the recent national nutrition survey (2013), it has been revealed that underweight prevalence among 5-10.0 years of age is higher (29.1%) than in other age group. For stunting, although there's an improvement since the last survey in 2011, it is still at 29.9% and wasting at 8.6% which is about the same in 2011 at 8.5%. Clearly this is a reason for concern and fortunately this situation has in recent years been brought to the attention of the country's planners, policy makers and legislators. Nutrition-related programs in schools are typically implemented independent from each other, thus, the complementation of these interventions has been limited. In an attempt to link these interventions, an integrated model was developed and tested through the phase 1 research project. Ways to bridge the various nutrition-related programs were implemented which resulted to positive nutrition outcomes.

Objectives of the Research for Development Progress

General objective:
To institutionalize and scale up a sustainable, holistic, gender-sensitive, and integrated school nutrition model to improve nutritional awareness and status of school-age children in the Philippines.

Specific objectives:
1. To fine tune an integrated school nutrition model for better implementation and integration into the school system
2. To test a multi-scalar approach to scale up and sustain an integrated school nutrition model
3. To use schools as platforms for nutritional and environmental learning and sharing

Despite the positive result generated in phase 1, operational issues remained. More adaptive research is needed in the area of enhancing garden sustainability, including ways to better protect the gardens from natural disasters and impacts of climate change. The use of iron fortified rice in school feeding was constrained by a lack of a regular supply (special arrangements have to be made with a supplier). Refinement and enforcement of the supplementary feeding guidelines are warranted even before the potential of gardens to support school feeding program is maximized. Sustainability of nutrition education in schools for both parents and children remains a challenge in terms of time (of both teachers handling the nutrition sessions and parents attending the sessions) and capacities (technical and materials). There is a need to explore further entry points within existing DepEd school activities (i.e. nutrition month, parents meetings and curriculum adjustment to integrate nutrition education). Strategies to sustain the model and its outcomes need to be explored and studied further i.e partnership with the local government units and the private sector. Although a number of ways to sustain these school-based interventions were identified in phase 1, these needs to be tested and enhanced prior to scaling up. Moreover, it is crucial to identify the different mechanisms that could facilitate the institutionalization of the model at various levels within DepEd as well as pathways for scaling up; the role of school gardens and the feeding activities in influencing knowledge and attitude of children and parents; how sustainable nutrition education can be; ways to efficiently implement and sustain the feeding activities in schools through partnership building involving bigger number of schools.

Research results on the gardening aspect can strengthen food production programs in the Philippines and elsewhere. School garden outputs using ecological approaches and its contribution to nutrition and awareness building were determined and can be used to draw out support for gardening program in schools and communities. Outcomes of extended school-base feeding program linked to gardens and nutrition education can be used for programming and policy making. Nutrition education activities identified as doable and sustainable can be used as basis for guideline development.

Research Methodology

Conceptual and Theoretical Framework

Fifty-eight schools in Region IVA were designated as lighthouse schools (LS) to serve as action research sites, to serve as point for expansion and as learning hubs for other schools. Three sentinel research schools in Cavite province were selected through purposive sampling from the pool of LS where rigorous data collection and further adaptation of the model was done. Qualitative and quantitative data were collected both in 3 sentinel schools and 55 LS but vary in terms of rigor.

Survey forms and questionnaires were developed and distributed to teachers at the start and end of the project to support data collection. All LS schools conducted nutritional assessment of Kinder to Grade 6 pupils the first 3 weeks within the start classes as per DepEd Memorandum No. s. 2016. All students enrolled in the school were weighed and height was measured to determine their nutritional status and thus identify the beneficiaries of the SBFP. For the study, FNRI-DOST verified the nutritional assessments in three sentinel schools and three LH schools from July to August 2016. Weight was measured using a calibrated digital double

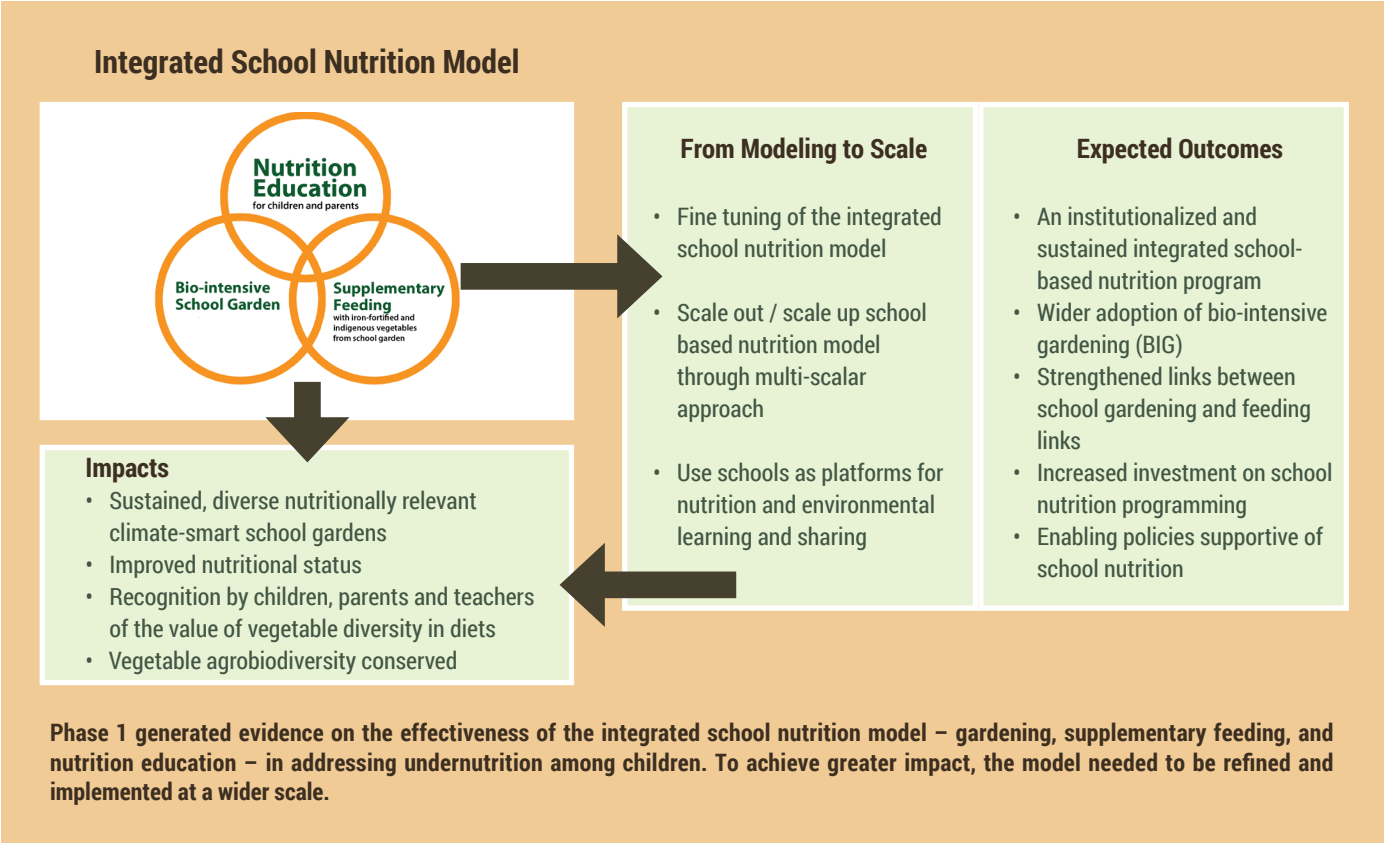


Figure 1. Conceptual and theoretical framework

window weighing Scale (SECA) recorded to the nearest 0.1 kg. Students were in light clothing, their footwear removed, and pockets emptied. Height was measured using a stadiometer (SECA) recorded to the nearest 0.1 cm. Data on the contribution of gardens to feeding, output of a 200 sq meter garden, role of gardens for learning and adoption and effect of BIG.NE strategies and activities that are sustainable and doable considering the school content were documented.

Results

Better integration of school gardens-school feeding, gardens-nutrition education and nutrition education-feeding were achieved. Mechanisms and strategies for effective integration and sustained implementation of gardens, supplementary feeding and nutrition education were identified. A careful study was done to understand functional and structural challenges reported by school staff in the previous research project (phase 1). Implementation guidelines were developed which facilitated, uptake, and served as manual of operations for schools.

Establishing Strong Links of Programs

School Garden - School Feeding Link

The following mechanisms paved the way for better linkage – familiarization of menu options by garden coordinators and garden planning with consideration to cycle menu; year round garden diversity; effective coordination between garden coordinator and school feeding coordinator; incorporation of the recipes with indigenous vegetables into the 20-day cycle menu of schools; sustained technical support from division school health personnel.

Fifty-six (56) schools confirmed garden produce were utilized in the school-based feeding program. In the twenty-one (21) LS with complete data, it was found that 42% of the total garden produce was used in SBFP, 24% was distributed for free to parent volunteers, students, and teachers who helped out in garden activities, 17% was given to the school canteen and 17% was sold. Findings show that vegetables produced in school gardens have multiple uses. Distribution of garden produce to students is one way to engage parents to participate in school gardening activities as well as in home gardening.

In the three (3) sentinel schools where certain mechanisms were put in place with close monitoring, there is a higher utilization of garden produce as compared to the rest of the LS. JES was able to used 82% of the harvest in the school-based feeding program (SBFP) with leafy vegetables (71%) contributing the most. SBES used 66% of the garden produce in the SBFP which are mostly leafy vegetables as well (41%). In TES, 54% was used in the SBFP where in 26% are leafy vegetables and 22% are fruit-bearing vegetables. There are cases where schools may need to invest initially in garden infrastructures and other garden inputs to address challenges

i.e. soil, composting bins, rain water harvesting tanks, drainage system to improve overall garden productivity.

When schools grow vegetables in their gardens and when menus feature diverse vegetables, schools can reduce the cost of feeding. Savings accumulate over a typical feeding cycle. Table 1 and 2 shows the savings that were generated by schools with the use of garden produce within 120 days and 200 days respectively. Table 3 show the number of children that can benefit from a 200 square garden. On the average, 32 students are estimated to be served with vegetable meal in 120 days considering that about 270 kilograms of various vegetables are produced in the school garden.

On the use of Iron-fortified rice, in a consultation meeting with retailers and at least 10 school administrators, it was revealed that scaling up of IFR within the school setting

Table 1. Total value of vegetables used in SBFP from the garden and potential savings in a 200-day feeding cycle in sentinel schools.

School	[a] Total no. of beneficiaries,	[b] SBFP total food cost for 120-day feeding (PhP) (a X PhP16 X 200days)	[c] Peso value of garden produce used in SBFP (PhP)
JES	278	889,600.00	35,127.63
SBES	769	2,460,800.00	36,389.64
TES	131	419,200.00	26,953.57
Average	**393**		

Table 2. Total value of vegetables used in SBFP from the garden in a 120-day feeding cycle in sentinel schools.

School	Total no. of beneficiaries	Total cost (PhP) (no. of beneficiaries X 16.00 X 120 days)	Peso value of garden produce used to SBFP (PhP)
JES	278	533,760.00	18,398.63
SBES	769	1,476,480.00	20,578.02
TES	131	251,520.00	10,194.88
Average	**393**		

require strong partnership with local businesses and local government units. Each school has their own supplier, thus, IFR should be made available to these suppliers via local rice distributors. Rice variety must also be considered to avoid plate waste among school feeding beneficiaries as observe in schools.

School Garden – Education Link

Use of gardens for learning is guaranteed if the following conditions are met:

- Gardens are functional all year-round. Year-round availability of vegetables in the garden can be achieved with cultivation of diverse crops combining both annuals and perennials and drought and pest/disease tolerant crops.
- Presence of information, education and communication within the garden
- Garden visit as a class activity or methodology are incorporated in the lesson plans of teachers
- Continuous monitoring and technical support from school administrator as well as division level supervisors

Table 3. Total number of children that can benefit from the garden produce shared to SBFP in the three sentinel schools.

School	[a]Total vegetables needed in recipe per child in 120-day feeding (kg)	[b]Total Garden Produce within 120-day feeding period (kg)	[c]Total garden produce used in SBFP recipe (kg)	[d]% of garden produce used in SBFP (c/b)	[e]Estimated number of beneficiaries (c/a)
JES	7.72	388.47	294.18	75.7	38
SBES	8.94	580.59	349.25	60.1	39
TES	8.82	412.69	168.87	40.9	19
Average	**8.50**		270.76	**58.8**	**32**

Fifty-two schools (52) were able to utilize school gardens in other learning areas aside from agriculture. In the 36 schools with complete data, the garden was mostly used in the following areas – Science (Grades 4-6), EsP (Grades 1-6), Mathematics (Grades 1-6), and Meeting time 2 (Kindergarten). Few schools reported to have used the garden in Social science, English, Filipino, Mother tongue and in other minor subjects. On a wider scale, institutionalization and sustainability can be achieved if use of garden is incorporated in the DepEd curriculum guide.

Nutrition Education - School Feeding Link

One of the strategic venues where nutrition education activities can be undertaken is the feeding center. Food serve can be a medium to discuss food value and functions which reinforces the actual feeding that happens. The following are the facilitating factors identified:

- Inclusion of nutrition education in the SBFP guideline
- Provision of nutrition education modules to SBFP coordinators
- Capacity building of SBFP coordinators
- Availability of ready-to-use materials such as flash cards, posters and flipcharts
- Technical assistance and follow up

Of the 58 LS, 44 schools were able to continuously deliver nutrition education during feeding activities via lecture, teacher demonstration, games, audio-visual presentation, cooking demonstration, nutri quiz, peer teaching, puzzle, and cook fest and garden tour. Different nutrition education modalities had improved knowledge of children and parents which had resulted to no plate waste among schoolchildren thereby had increased vegetable consumption. The nutrition education activities have also built a sense of cooperation among parents to help in the feeding activities and in maintaining the vegetable gardens as observed in schools.

School - Community Partnership

Barangay officials from the 3 sentinel research schools were engaged to during the 80 days additional feeding since it fell during school vacation. Barangay health workers and barangay nutrition scholars were responsible in bringing children from the community to school at lunch time and supported teachers in the conduct of the actual feeding. There are also other ways identified where community volunteers can be engaged to support school nutrition activities such nutrition assessment, home visits of identified undernourished school children and nutrition education activities.

Outcomes

Improvement in soil quality

Bio-intensive garden techniques help regenerate the soil and replenish its capacity to grow healthy crops. Two years after the introduction of bio-intensive gardening, soils were tested in the 3 sentinel research schools. Two types of soil sample were collected and analyzed from the 3 schools: (1) soil collected from sites without intervention and (2) soil collected from sites where BIG practices were used. Table 3 provides evidence of the improvement in soil fertility status (availability of essential soil nutrients) in soils. The implications of these changes were important. For example, a decrease in soil pH from 7.6 to 7.2 can be expected to result in improved availability of most essential elements (N, P, K, CA, and Mg) needed for growing vegetables. However, especially significant were the high amounts of nitrogen, phosphorus, and organic matter in gardens that employed bio-intensive gardening practices. The use of climate- and nutrient smart practices – i.e., application of organic matter and fertilization (compost and liquid fertilizer), cover cropping, crop rotation, green manuring, mulching, crop diversification – would have contributed to overall improvement of soil nutritional status and health.

Diversification of Schools Gardens and Conservation of Indigenous Vegetables

Garden diversity was identified as one of the factors that influenced garden functionality and sustainability. Continuous and intensive promotion of indigenous vegetables and substantial distribution effort contributed to achieving garden diversity. Different types of vegetables such as leafy, fruit-bearing, legumes, root crops, fruit trees, and herbs are grown in schools. After the intervention, an average of 26 crops was recorded in the 58 schools Crop diversification led to availability of different types of vegetables with varied nutrients and provides teachers the flexibility in the choice of ingredients. A small portion of schools had difficulty achieving crop diversity (10%) all year round due to seed saving and seedling propagation challenges. Thus, promotion of these garden activities is warranted.

Improvement in the Nutrition Status of Undernourished Children

DepEd's regular feeding program runs for 120-days from July to December of every school year. The project supported an additional 80 days to study the effects of 200-days feeding on the nutritional status of school children and identify mechanisms to engage local government units. The developed recipes and Moringa-based recipes were combined to complete the 20 cycle menu. Iron-fortified rice was used in the 3 sentinel schools and was procured directly from Nutridense. The following are the results of the 120-day feeding and the additional 80-day feeding:

Benefits gained from the 120 feeding days:

- There was a significant increase in the mean weight (p-value=0.000) and height (p-value=0.000) of children both male and females
- The increment in the mean height of the male students aged 5 to 10 y.o. from baseline to midline (after 60 feeding days) was 1.99 cm while for females 2.05 cm. These increments are lower than the normal increase of 2.21 cm for malesand 2.48 cm for females of the same age group. However, the increment from midline to endpoint (after another 60 feeding days) was 1.51 cm (males) 1.70 cm (females) which is higher compared to the normal increase of 1.32 cm and 1.51 cm, respectively. Same result was observed in the female students' aged 10.1-19 years. However, increment in the mean height of the male students from midline to end point is similar (1.68 cm) compared to the normal increase of 1.69 cm.
- There was a significant decrease in the proportion of undernourished students aged 5.1-10 and 10 to 19 y.o. from baseline (100%) to endpoint (64.71%).

Results of additional 80 feeding days in sentinel schools:

- To determine if there exist further additional benefits for extending the feeding period for another 80 days during the 2 and half school break, the schools have continued feeding in school. Each school had different strategies to convene children from the community to the school. There were 195 out of 277 students participated in the additional 80 feeding days after the regular 120 feeding days in the sentinel schools.
- There was a further significant increase in the mean weight and height of the students at end of the 80 feeding days in both age groups and gender. Same result was also observed in the mean height of students in older age groups and gender.
- High compliance of daily feeding in school was between 50 to 60 days and only 12% had completed the 80 days.

Table 4. Results of soil analysis in the three sentinel schools.

	Non-BIG area			BIG area		
	JES	TES	SBES	JES	TES	SBES
Soil pH	7.6	7.6	7.8	7.2	7.2	7.5
Nitrogen (N)	Low	Low	Low	High	High	High
Phosphorus (P)	Medium	Medium	Low	High	High	High
Potassium (K)	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient	Sufficient
Organic matter (OM), %	1.56	1.37	0.92	2.23	5.68	1.46
Calcium (Ca) cmo_{lc}/kg soil	21.19	15.75	17.25	15.41	16.31	18.02
Magnesium (Mg) cmo_{lc}/kg soil	15.41	4.5	5.17	5.62	6.14	2.2

Bringing the model to scale through a multi-scalar approach: Scaling up Mechanisms and Strategies Deployed

Creating an enabling environment at the national and sub-national level

One of the important requirements for adoption and implementation of the model is the issuance of memorandum order since DepEd still follows a centralized set up. In the 2016 memoranda were issued which include bio-intensive gardening approach and establishment of crop museums in every school division in national guidelines of GPP (DepEd Memorandum No. 223, s. 2016 and DepEd Memorandum No. 223, s. 2016); use of iron fortified rice and recipes with indigenous vegetables in feeding in the school-based feeding program national guidelines (DepEd Order No. 39, s. 2017); At the regional level, 2 memoranda were sent to all the 19 divisions of Region 4A in support of the implementation of model and establishment of additional crop museums in 2017 (Regional Memorandum No. 226, s. 2016 and Regional Memorandum No. 446, s. 2017). This served as a legal document allowing school administrators to incorporate activities into their school improvement plan and in turn allow them to allocate resources to strengthen the program. At the division level, memorandums were also issued to reinforce the regional level memorandum.Phase 1 study result as well as the developed information, education and communication materials were instrumental in setting a supportive environment.

Multi-level capacity building program for school program implementers

The capacity building program was designed not only for school level implementers but also school officials and program planners at various levels of DepEd. The program includes training of trainers; consultative workshop with school principals; orientation of division-level school officials; learning and sharing events; provision of IEC materials, basic garden tools, planting materials and on-site coaching and mentoring of local actors. Prior to the training, the team developed a training of trainers manual and was given to lighthouse schools. Series of orientation of school officials were held at the national level and in every province in Region IVA to generate interest and support. For technical assistance of local actors, it's important to consider the staff movement within DepEd system in planning and programming to avoid unplanned visit for re-training/re-orientation.

Development and management of IEC materials

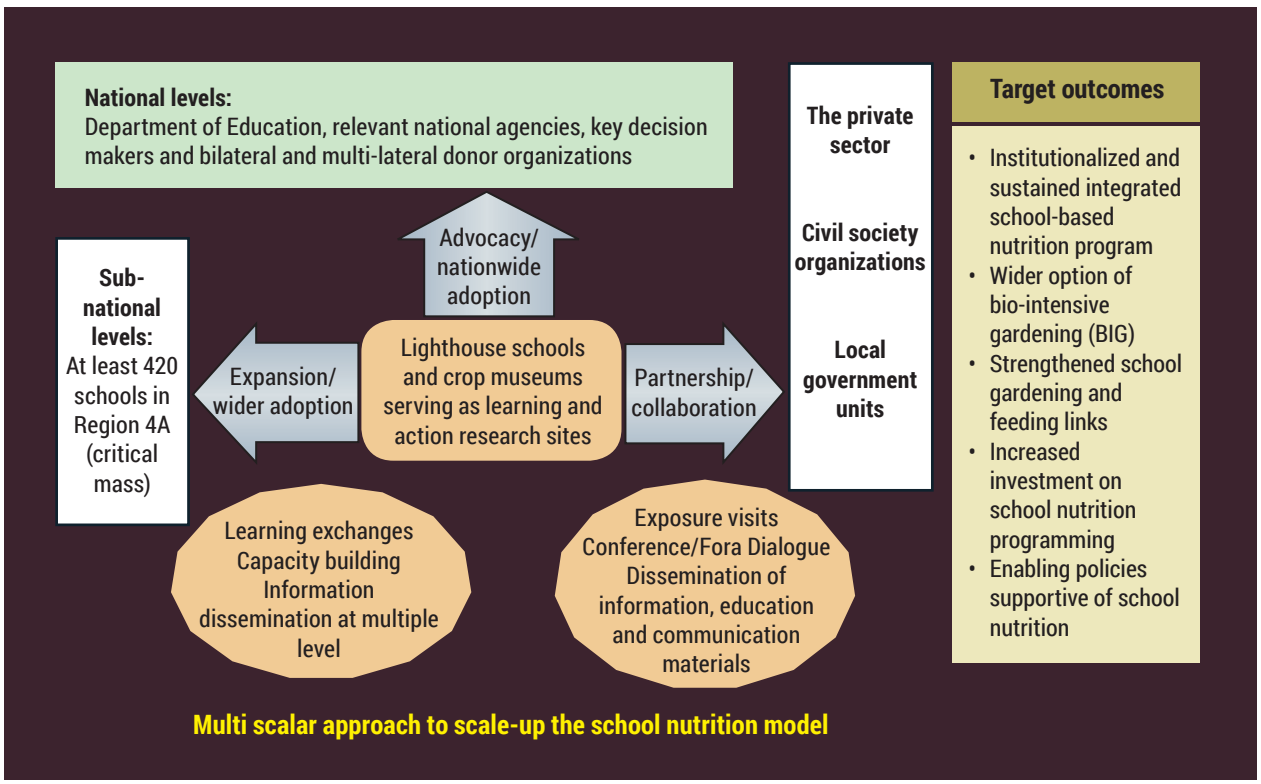
The complete package of information, education and communication (IEC) materials acted as catalyst in the diffusion of the model and guidelines. Different forms of IEC materials were developed as support to school implementers and as promotional materials to officials at various levels. Most of the IEC materials were from in phase 1 and were enhanced in the 2nd phase. For school-level implementers, the following materials were given – 7 posters, integrated school nutrition model 1-page handout, lighthouse school primer, crop museum primer, training manual, nutrition education modules, crop information, crop labels, BIG standards and NE guide handout. A school nutrition brief which presents the research project and strategies was

developed and were given to schools officials at different levels during the project inception phase. A summary of phase 1 research results for each component were also packaged into a single hand outs. These hand outs include costing for each component intended to be used both schools and the project team to generate support for school nutrition program needs.

IEC materials are accessible at https://schoolnutritionphils.wordpress.com/). The project implementation team formed per division was helpful to disseminate information faster to schools in the region.

Establishment of network of lighthouse schools

A lighthouse school (LS) is a designated focal point for establishing evidence (decentralized and location-specific action research (site) of integrated school nutrition model) and for supporting the advocacy and outscaling efforts of school nutrition by the Department of Education in the Philippines. LS played the main role in the dissemination of the model at the sub-national level. Fifty-eight (58) LS were established within Region 4A also known as CALABARZON. Learning and sharing events were conducted in LS. To date,



Scaling up approach and target outcomes.

19 school division conducted strategic activities to disseminate the model within their respective school districts and division using various methods i.e orientation, issuance of memorandums and training.

The 58 LS were also designated as crop museums (CM). Crop museum in schools serve as a focal point for saving crop varieties. This is a garden where teachers, students, and community members can view a diverse range of nutritionally relevant and climate hardy vegetables. Crop museums also serve as nurseries (source of planting materials) for surrounding schools and communities. Selection of LS used the following criteria- garden areas should be at least 200 sq meters, garden's performance in the past years, performance of agriculture teacher and support from the school administrator to nutrition program. Face-to-face dialogue with school administrators was important to ensure clarity on roles of LS and crop museums and to discuss challenges affecting implementation.

Establishment of additional crop museums and seed exchange activities

School crop museum (CM) played a role in the dispersal of planting materials across the 19 school divisions in Region IVA. Additional 237 school crop museum were identified to serve as community seed banks of nutritionally-relevant indigenous crops in the Region. Support extended includes planting materials and information, education and communication materials. The goal is to have 1 crop museums per school district (cluster of 10 schools).

Seed exchange is another event that was successfully institutionalized within Region IVA to facilitate retrieval and popularization of indigenous/local vegetables and promotes self-reliance among school divisions. Eighteen (18) divisions were able to conduct seed exchange involving 1359 schools. Seed exchanges contributed to conservation of agro-biodiversity and promote garden diversification.

Multi-stake holder events to build broad-based partnership for school nutrition

Multi-stakeholder events have been recognized as a platform for sharing of good practices and innovation to diverse audience. They are important in publicizing innovations and research results to a wide-range of potential users. Two major events were organized to introduce the integrated model and draw support for school nutrition. During these 2 events, exhibition of IEC materials, recipes, seeds, indigenous vegetables and garden visit were part of the program.

Research dissemination via multiple platforms

The research team was invited to several events where the model and the scaling up strategies were shared. Representative from the project team participated in the exhibit during the Food Security Forum at the Asian Development Bank in June 2016 to showcase the integrated school nutrition model. The model and initial findings were also shared to following events - Philippine Association of Nutrition (PAN) Convention in July 2017 with more than 1000 attendees; Philippine Society of Nutritionist-Dietitians, Inc. (PSND) Convention in October 2017 with 250 participants; DepEd Region 4A International Conference of Basic Education Researchers (ICBER) 2017 with 2287 participants; DSWD MIMAROPA Review and Planning Workshop for Supplementary Feeding in 2017 (activity reports will be shared upon request).

The research was also presented during DepEd national events such as DepEd Gulayan sa Paaralan Program National Workshop in 2017 and Consultative Workshop on Nutrition Services in January 2018 (activity reports will be shared upon request).

In South East Asia, project experience was shared during an IIRR's organized round table discussion in Yangon, Myanmar in September 2016 attended by 50 participants from 46 agencies. This was followed by learning and sharing activity among officials from IIRR, DepEd, and FNRI-DOST and officials from Myanmar Ministry of Education and Health. The project was also shared in the Southeast Asian Ministers of Education Organization-Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEAMEO-SEARCA) international conference on multi-functionality of school gardens and training of trainers in April 2018 with 156 participants from South East Asia (activity report will be shared upon request).

A website https://schoolnutritionphils.wordpress.com/ was set up and maintained where outputs are shared to wider audience.

Generating evidence for scaling up and policy formulation

The project worked on the assumption that scaling up and institutionalization of innovations relies on evidence of its effectiveness and scalability. Evidence generated in phase 1 and 2 played a major role in influencing national-level program planners to adopt the model and allocate resources for nation-wide dissemination. The availability of a range of knowledge products is an evidence of its readiness to be scaled up. The establishment of 58 LS led to wide-scale data collection. In order for the 58 LS to take on those roles, a capacity building program was implemented. Baseline and endline data were collected and analyzed to serve as basis for recommendations and policy formulation. Teachers played a significant role in documenting activities and data within their respective schools.

Data collected showed that all 58 lighthouse schools are practicing the bio-intensive gardening at different levels. Garden diversity has been achieved in most schools and the link between gardens to feeding and learning were evident. In the 3 sentinel research schools, the 120-day school feeding program of the Department of Education (DepEd) resulted to significant increase in the mean weight of students from baseline to endline. The extended feeding program or additional 80 days was implemented by the project in 3 sentinel research schools and was completed in July 2017. Nutrition education activities that were commonly used and sustained were documented. Data and results presented to DepEd national-level program planners in 2017 and this led DepEd to allocate certain amount in their 2018 annual budget for the national-level training for 220 LS, 1 in every school divisions in the country.

Round table dialogue and targeted discussions

Round table dialogue (RTD) and targeted discussion were organized with key decision makers and officials which resulted to positive outputs. The project team met with different key officials of DepEd at the start of the project to secure needed support and to ensure adoption by schools. After data were collected and analyzed, series of meetings with different key officials at the national office was done to advocate and present the study.

Two key RTD with Department of Agriculture (DA) was done. The RTD allowed both parties to share initiatives and identify similar objective and ways to collaborate. The project team met with key DA officials in October 2016.

Round table discussion is also seen as an effective means to engage and solicit support of local government units (LGU). Discussions were held with local government officials organized by the 3 sentinel schools. This platform brought together DepEd supervisors, school principals and local government unit to discuss ways that LGUs can support schools on its nutrition program.

Engaging the media

It is recognized that media have a major role in influencing the wider public. Reporters and writers were engaged in an attempt to draw media's attention to important issues such as nutrition and food security, role of agro biodiversity, climate change, and food safety. A compilation of resource materials especially prepared for media personnel were distributed. Three media professionals were given additional and longer exposure visits and participated in events undertaken as part of this project. Outputs of this strategy were nine write ups about the project.

Use of social media as platform for information sharing

Social media remains to be a significant and low cost platform to disseminate new knowledge, lessons learned, accomplishments, activities and innovations among community of practice to sustain a movement. The project team created a Facebook group (GarNeSupp) that has now 1047 members composed mostly of school teachers (https://web.facebook.com/groups/GarNESupp/). The site is being utilized by schools teachers to share activity photos, announcements and training opportunities.

Outcomes Achieved at the Sub-national Level

Wide-scale adoption of BIG

Continuous capacity building through experiential training; provision of information, education and communication material; and regular visit for technical input and monitoring led to adoption of practices and further out-scale of BIG approach. The bio-intensive garden standard was enhanced and disseminated to maximize the multi-functionality of gardens. Data collected in 58 schools showed that there is significant increase in the adoption of 12 BIG practices. In a number of schools, management of garden and adoption of BIG were affected by teaching loads of coordinators and overlapping school activities.

Adoption of recipes with indigenous vegetables

The DepEd schools are required to use a minimum of 20 cycles (1-2 months) of menu, with the recommended rice and viand. A variety of menus exists, including the malunggay-based recipe and others that were recommended by each schools division offices. The 15 recipes developed were already introduced during Phase I. The 15 recipes with indigenous vegetables were recommended because the recipes are already standardized and included indigenous vegetables as primary ingredient options. Recipe adaption can help in utilizing garden vegetables in compliance with set guidelines. Schools were encouraged to adjust or explore other recipe combinations of recipes to enable them to utilize the garden produce and to meet the needs of beneficiaries. From 7.19 recipes, the number of recipes adopted had increased to 9.70.Aside from the support given to schools, the issuance of memorandum that includes the endorsement of the 15 recipes led to increase in adoption.

At the initial phase of the project, a number of school division offices strictly used the Moringa-based recipes, thus it limits the use of other vegetables from the garden. In schools with flexibility in its menu cycle and with more number of days within a cycle have allowed further utilization of garden produce and somehow influenced the garden produce diverse crops and vegetables.

Adoption of nutrition education strategies

Nutrition education (NE) strategies included in the guideline were divided into two main modalities – non formal and formal. Non-formal NE methods target parents, teachers and the general community whereas formal NE modes are directed towards students. The most widely used mode of NE is the participatory NE activities for community and parents (83.64%), followed by NE during feeding (74.55%), nutrition integration in lessons and NE during PTA/PTCs both at 67.27%, and garden-based nutrition-education (65.45%). The following must be considered for effective and sustained nutrition education are - availability of sufficient human and material resources, sustained support and interest of parents/guardians, and nutrition knowledge and skills of program coordinators.

Teacher-to-teacher extension fostered

Trained teachers were given the responsibility to train other teachers within their respective school districts or school divisions. A total of 1,598 schools and 626 parents were reached. Inter division learning exchanges and benchmarking activities were conducted across the region. In addition, LS schools shared seeds to other schools within their own division.

Table 5. Average number of recipes Used and adapted from the 20 recommended FNRI recipes.

Recipe source **N=58**	**Baseline** June 2016 S/Y 2016 – 2017 Number of recipes adopted	**Endline** November 2017 S/Y 2017-2018 Number of recipes adopted
Recipes with indigenous vegetables	7.19	9.70
Malunggay-based	12.83	10.30

Additional investment in building capacities of schools

Baseline information was presented to DepEd Region IVA program planners. One of the issues pointed out is the capacity of school staff in conducting nutrition assessment. As a response, the Education Support Services Division (ESSD) of DepEd Region 4A which oversees the school-based feeding program organized a three-day training in November 2016 to capacitate school health personnel composed of medical doctors and nurses. ESSD also allocated funds for 17 sets of weighing scale and height board for the schools and city divisions.

Outcomes Achieved at the National Level

Collaboration and resource-sharing

Constructive dialogue with various government officials of the Department of Agriculture (DA) and the Department of Social Welfare and Development (DSWD) led to multiple training to disseminate the model. The Department of Agriculture- Bureau of Plant Industry (DA-BPI) funded the 3-day training for 37 participants composed of 23 DA regional level staff from the 17 regions of the Philippines and 14 DepEd regional level representatives. This was followed by a training program funded by DSWD Region IVA (DSWD IVA) for 88 participants in 2017 and a planned training for 177 child development workers of 4 provinces.

Increased investment on school nutrition

At the national level, the model and the scaling out plan were presented in strategic events. During the formulation of the Philippine Plan of Action for Nutrition (PPAN) 2017-2022, the Department of Education made a commitment to promote the integrated school nutrition model to all schools in the Philippines so in 2017 DepEd allocated resources for teachers' training and reprinting of all IEC materials. A total of 220 schools, one from each school divisions across the Philippines are being trained to be lighthouse schools. Three regions (Region I, II, CAR) have already been trained.

Institutionalization of the model

A discussion with a DepEd undersecretary led to an agreement to have a DepEd Memorandum Order for schools to adapt and implement the integrated school nutrition model. Crafting of the memorandum order is on-going and once signed by the secretary, all the 38, 600 public elementary schools in the Philippines will now have access to the integrated approach.

Schools as platforms for nutritional and environmental learning and sharing

Schools have the potential to directly influence learners and indirectly their parents on . The following are the enabling factors for schools to serve as local level platforms for nutritional and environmental sharing – capacity development and sensitization of school administrators, development and dissemination of nutrition-agriculture learning modules for teachers, promotion of garden-based teaching, promotion of an approach that allows children to bring acquired skills and knowledge at home i.e distribution of garden produce and seeds, designation of nutrition and environmental education coordinator (if possible). The nutrition awareness month is another

Nutrition and environmental knowledge of children can be reinforced during classroom activities, school feeding activities and garden visit. These activities are feasible based on data collected from LS. Thirty seven LS were able to integrate nutrition and related themes in other subject areas - Mathematics (70.27%); more than half of the 37 LS integrated nutrition in Araling Panlipunan (Social Studies), Edukasyon sa Pagpapakatao (Values Formation), English and Filipino. All these subjects are taught in Grades 1 to 6 in elementary. Nutrition education during feeding time was carried out by 41 LS. Thirty-six LS reported that they conducted garden-based learning activities during the project period.

Meanwhile, to reach parents/community members, schools organized participatory nutrition education activities that make use experiential learning methodology. Activities done by schools were recipe development and garden tours. Forty-six lighthouse schools were able to conduct these activities during the past 24 months and most schools reported to have done it in July during the nutrition awareness month which is mandated through a presidential decree. Nutrition education was also delivered during the parent-teacher association meeting and parent-teacher conference as implemented by 37 LS. Distribution of seeds to community members was also noted. Only 13 LS that were able to record properly, about 327 individuals were given planting materials.

DIVISION OF CAVITE PROVINCE

1. Upli Elementary School (ES)
2. Amadeo ES
3. Mariano Anakay ES
4. Carmona ES
5. Bailen ES
6. General Gregorio S. Aloiia Sr. Memorial ES
7. Sunnybrooke ES
8. San Gabriel 2 ES
9. Indang Central School (CS)
10. Alulod ES
11. Potol Sta. Isabel ES
12. Medina ES
13. Maragondon ES
14. Panungyan ES
15. Naic ES
16. San Roque ES
17. Noveleta ES
18. Bagbag 2 ES
19. Kalubkob ES
20. Bulihan Sites & Services Project ES
21. Maguyam ES
22. Pulongbunga ES
23. Malabag ES
24. Carlos Batino Memorial ES
25. Isidro Cuadra ES
26. Julugan ES
27. Ternate CS
28. Lapidario ES

City Division of Bacoor

29. Talaba ES
30. Bacoor CS
31. Malipay ES

City Division of Imus

32. Imus Pilot ES
33. Governor Camerino ES
34. Tinabunan ES

City Division of Dasmariñas

35. Dasmariñas II CS
36. Dr.Jose P. Rizal ES
37. Langkaan ES
38. Malinta ES
39. Paliparan ES

City Division of Cavite

40. Sangley ES

DIVISION OF LAGUNA PROVINCE

41. Liliw Central ES
42. Majayjay ES

City Division of Biñan

43. Timbao ES

City Division of San Pablo

44. San Roque ES

City Division of Calamba

45. Eduardo Barretto, Sr. ES

City Division of Sta. Rosa

46. Caingin ES

DIVISION OF QUEZON PROVINCE

47. Pitogo CS
48. San Antonio CS

City Division of Lucena

49. Lucena East III ES

City Division of Tayabas

50. North Palale ES

DIVISION OF BATANGAS PROVINCE

51. Ayao-lyao ES
52. Pinagtungulan ES

City Division of Tanauan

53. Tinurik ES

City Division of Lipa

54. Lumbang ES

City Division of Batangas

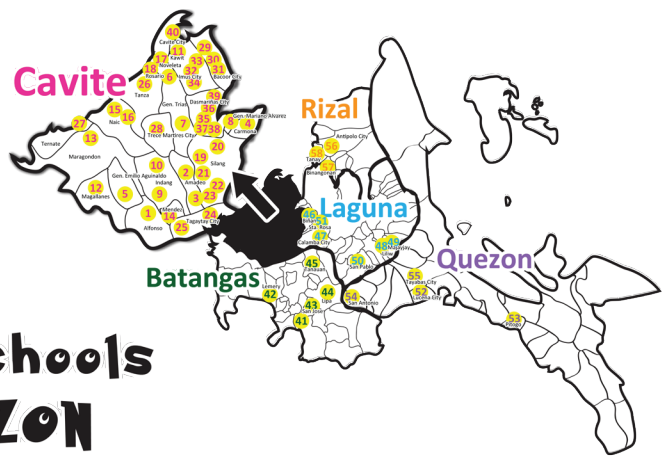
55. Malitam ES

DIVISION OF RIZAL PROVINCE

56. Binangonan ES
57. Wawa ES

City Division of Antipolo

58. Kaysakat ES



Lighthouse Schools in CALABARZON

International Institute of Rural Reconstruction
Emilita M. Oro
Irish P. Baguilat
Ma. Shiela S. Anunciado
Ian Curt R. Sarmiento
Kirstein D. Itliong
Ronnie M. De Castro
Angie A. Algo

Food and Nutrition Research Institute - Department of Science and Technology
Imelda A. Agdeppa
Carmina Alicia N. Lainez
Wargin P. Longalong

Technical Advisers
Julian Gonsalves
Mario Capanzana

Department of Education
Rizalino Jose T. Rosales
Ella Cecilia G. Naliponguit
Maria Corazon C. Dumlao
Magdalane Portia T. Cariaga
Ferdinand M. Nuñez
Mei-Ling V. Duhig
Diosdado M. San Antonio
Annaliza T. Araojo
Neil B. Evangelista
Romeo E. Endraca
Rolando B. Talon, Jr.
Virgilio O. Guevarra
Yolanda S. Oliver
Galileo L. Go

Department of Agriculture- Region 4A
Felix Joselito H. Noceda

Design and Layout
Celso Amutan

IIRR
INTERNATIONAL INSTITUTE OF RURAL RECONSTRUCTION

Philippine Country Program
Regional Center for Asia
International Institute of Rural Reconstruction (IIRR)
Km. 39 Aguinaldo Highway, Y.C. James Yen Center
Biga 2, Silang, Cavite 4118, Philippines
Email: philippines@iirr.org
Tel. No: +63 46 430 0016
www.iirr.org

For more information:
Garnesupp: Integrated School Nutrition
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